

Energy Management Program

1. Scope

This program is limited to management of electricity as an energy source. This may extend to other sources of energy (eg steam) only if electricity is the initial source used for its generation.

The energy management program is generic and covers all UQ sites, except for Moreton Bay and Heron Island Research Station's and the Indooroopilly Experimental Mine as these have specific Environmental Management Systems (EMS) tailored to their unique operations.

2. Objectives

- To conserve energy and minimise energy waste by The University. This will be done by identifying areas with potential for energy minimisation and implementation of energy efficient systems.
- Define responsibilities and budget allocations for energy management;
- To monitor UQ's energy management performance when judged against relevant industry standards.
- To report on energy use and energy saving projects and create a culture of energy efficiency at UQ.

3. Energy Consumption

UQ is a large energy user with over 700 buildings and 18,000 computers and a population of over 40,000 students and staff. In 2008/09 UQ in total used over 130,000,000 kwh of electricity. This is equivalent to the energy use of over 8,000 houses (The State of Queensland, 2010). Therefore it is important for UQ to operate its facility's using best practice in energy management and minimise the University's impact on the environment.

Total energy consumption at UQ has been steadily increasing due to an increase in campus size. The energy usage intensity has also been increasing due to a number of factors, such as increases in:

- Number of students
- Operating hours and greater demand for 24-hour access
- Demand for air-conditioning
- Number of computers and other equipment
- Research activities which are more energy intensive than office and teaching facilities with their extra requirement for specialised equipment and 24-hour controlled environments.

The vast majority of energy consumption is attributed to UQ's four campuses. St Lucia campus accounts for approximately 83%, Gatton 5%, Ipswich 3% and Herston 4%.

A comprehensive energy mass balance within each campus has not been conducted. This will occur in 2010 or 2011. However an estimated breakdown of UQ St Lucia Energy Consumption is as per Figure 1. The main energy consumption is through air-conditioning and lighting and use of laboratory and office equipment.

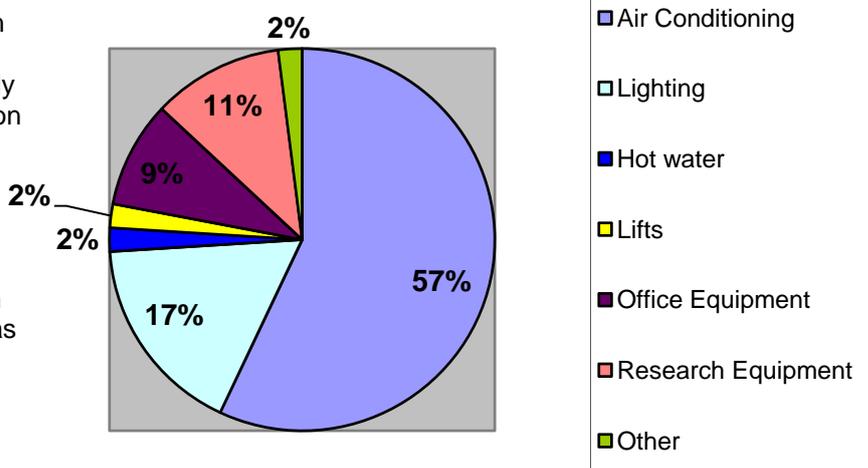


Figure 1: Estimated Breakdown of St Lucia Energy Consumption

Property and Facilities Division (P&F) is responsible for the construction and maintenance of university buildings and therefore have the opportunity and responsibility to provide energy efficient facilities and systems for occupants. Likewise Schools, Centres, Businesses, Research Facilities & Student Associations have the opportunity to reduce the impact of energy consumption by using facilities wisely.

There are three distinct areas within the University where energy is consumed, they are:

3.1 Occupants

Occupants of all areas of The University whether University or independently operated within a building have control of the operation of lighting, equipment and occupant controlled air conditioning in their areas. The following procedures should be adopted by University staff to use energy wisely.

| Responsible person | Action |
|--|--|
| <i>Air-conditioning</i> | |
| Individuals | <ul style="list-style-type: none"> Keep doors and windows closed in air-conditioned space, particularly doors leading to stairwells and external areas. Use air-conditioning during typical operational hours only. To reschedule times and/or investigate installing an out-of-hours button, email wcc@pf.uq.edu.au |
| Lecturers | <ul style="list-style-type: none"> When booking lecture theatres through central bookings, advise central bookings if the lecture is cancelled or moved so that air-conditioning and lights aren't run unnecessarily. |
| <i>Lights</i> | |
| Individuals | <ul style="list-style-type: none"> Switch off lights when absent from your work area for more than 30 minutes and at the end of the day, including in bathrooms, meeting rooms, lecture theatres and corridors. Maximise the use of natural light and turn on lights only when there is inadequate lighting. |
| Cleaners | <ul style="list-style-type: none"> Switch off lights when leaving the area. |
| <i>Computers and monitors</i> | |
| Individuals | <ul style="list-style-type: none"> Switch off monitors when absent for more than 30 minutes Switch off computers and monitors at the end of the day. Do not use screen savers as this does not save energy. Set screensaver to 'none' or 'blank screen'. Adjust your power management settings to put your screen to sleep if it is not in use for more than five minutes. |
| IT Officers | <ul style="list-style-type: none"> Advise on PC energy saving features. |
| <i>Photocopiers, printers and faxes</i> | |
| Individuals | <ul style="list-style-type: none"> Where possible use email, circulation lists and electronic archiving in preference to printing. Switch off printers and fax machines if they are not being used. Ensure power management functions are operational. Use double-sided copying and printing whenever possible |
| Managers | <ul style="list-style-type: none"> Ensure staff are trained to use energy and paper saving features |
| <i>Purchasing equipment and appliances</i> | |
| Purchasing Officers | <ul style="list-style-type: none"> Buy equipment that has double-sided printing and photocopying facilities. Buy the most energy efficient star compliant equipment and appliances. |
| <i>Kitchens and bathrooms</i> | |
| Individuals | <ul style="list-style-type: none"> Load up the dishwasher before running it for maximum efficiency. Turn off the auto boiler at night. (Before you do this, check to see if it is already on a timer to automatically switch on and off). Minimise hot water usage. |
| <i>Laboratories</i> | |
| Individuals | <ul style="list-style-type: none"> Turn off laboratory equipment that can sensibly be turned off when not in use, especially anything with a heating or cooling function e.g. microscopes. Keep fume hood sashes at their lowest as much as possible. Fume hoods not only operate more effectively but this significantly reduces the air conditioning load and associated energy usage. |
| Report faults to Property and Facilities' Works Control Centre on 3365 2222 or email wcc@pf.uq.edu.au | |

3.2 Base Building

The base building or building central services include; common area lighting, lifts and heating, ventilation and air conditioning (HVAC) systems. The efficiency of these systems is determined by the design, construction and commissioning of a building as well as the service and maintenance of the systems. Central Services are often controlled by a Building Management System (BMS) so that they will switch on and off where and when required. Base Building energy management is detailed in section 4 of this procedure. An illustration of energy management at St Lucia campus is illustrated in Appendix 2.

3.3 Grounds

Lighting is used around the campus to light ovals, walkways, buildings and car parks. Some outdoor lighting is operated by time clocks which can be used to limit the time they are on (e.g. they can be scheduled to turn on between 6pm and 10pm only, limiting the hours of use). Most of the remaining outdoor lighting is operated by PE cells which switch on only at night. Decorative and other non-essential lights need to be changed to time clocks in order to reduce operating times to match hours of operation. Security lighting is required to be on all night and shall remain on PE cells.

| Responsible person | Action |
|------------------------------|---|
| P&F Supervisor Electrical | <ul style="list-style-type: none">Oversee installation and maintenance of PE cells and time clocks. |

4. Building Energy Minimisation Strategies

4.1 Energy Supply and Green Power

In the deregulated energy market, the University has the opportunity to minimise the cost of purchasing electricity for its campuses. For large sites, the supplier is determined by a tendering process where cost (supply tariffs) is only one of the elements, but where the overall selection leads to value for money. P&F Engineering is responsible for arranging and managing these contestable energy contracts. See Appendix 1 for list of contestable sites.

P&F Engineering also negotiates metering and green power contracts as required. UQ purchased 2.5% certified green power in 2008 and 2009, which comprised of wind, solar, landfill gas and bagasse. The purchase of Green Power is reviewed on an annual basis by P&F.

| Responsible person | Action |
|--------------------------------------|---|
| Executive Director Operations | <ul style="list-style-type: none">Approve and sign contestable energy contracts. |
| P&F Deputy Director | <ul style="list-style-type: none">Decide on green power purchases and provide funding |
| P&F Engineering Manager | <ul style="list-style-type: none">Oversee electricity contracts for contestable and regulated sitesOversee green power projects and make recommendations to P&F Director |
| P&F Senior Electrical Engineer | <ul style="list-style-type: none">Organise electricity contracts for contestable and regulated sitesResearch and advise on green power purchases |
| P&F Engineering Project Officer 6 | <ul style="list-style-type: none">Compile data required for electricity and green power contracts |
| P&F Environmental Engineer | <ul style="list-style-type: none">Advise on green power purchases |

4.2 Energy Metering and Monitoring

There are four reasons the University monitors energy consumption;

1. To understand energy use at UQ and identify big energy users
2. To measure the energy consumed and the greenhouse gases generated by the University so that progress towards any set targets can be measured and benchmarked with similar Universities;
3. To ensure that the central building services are running correctly and not using energy unnecessarily.
4. To measure the outcome of energy efficiency programs.

P&F Engineering is responsible for installation and maintenance of metering systems. This is conducted at the site level and sub-metering for buildings and in some cases further sub-metering to monitor energy use of certain activities (e.g. HVAC, lighting and equipment) or energy use of building floors/areas.

4.2.1 Site Metering

Electronic bills for all contestable sites are sent by the energy supplier to P&F Finance Officer, who passes this information on to P&F Engineering. Engineering Project Officer 6 is responsible for collating this information so that energy use can be tracked and analysed over time.

Electricity bills for most other sites are sent in hard copy to P&F Finance Officer. P&F Finance Officer transfers relevant information and data into an excel spreadsheet, saved in a share file on the P&F Intranet for energy analysis by P&F Engineering (to cross reference with electronic data to check UQ has been billed correctly) and carbon monitoring by P&F Project Officer Sustainability (See Carbon Monitoring Procedure).

4.2.2 Sub-Metering

P&F Engineering is responsible for UQ's sub-metering program and monitoring of metered data. The majority of buildings at St Lucia campus are now metered and it is standard practice to install meters on any new buildings. Currently about half of these are manually read on a monthly basis while the others are automated.

An advanced excel application (Energy Analyser) has been developed for detailed analysis of automatic meter readings. A Utility Data Base is being developed by P&F Engineering for energy profiling and analysis for UQ sub-meters. The data base is expected to be complete by 2011.

4.2.3 On-Charging Businesses for Energy Use

Many businesses that operate within the St Lucia campus are required to pay for electricity consumption. P&F Engineering is responsible for metering their energy use and sending consumption data to P&F Finance Officer to organise on-charging.

Table 1: Responsibilities for the Energy Metering Program

| Responsible person | Action |
|------------------------------------|--|
| P&F Deputy Director | <ul style="list-style-type: none">Decide on significant metering projects and allocate funding |
| P&F Engineering Manager | <ul style="list-style-type: none">Oversee metering projects |
| P&F Senior Electrical Engineer | <ul style="list-style-type: none">Research and advise on metering optionsProject manage metering installation and maintenanceOversee metered data analysisDevelopment of database and energy analyser programs as required |
| P&F Engineering Project Officer 6 | <ul style="list-style-type: none">Analyse metered data and report trends and analysisMonitor electricity use of on-site businesses that need to be on-charged for electricity use and report energy consumption to P&F Finance Officer. |
| P&F Project Officer Sustainability | <ul style="list-style-type: none">Incorporate energy data into broader carbon monitoring program (see carbon monitoring procedure for details) |
| P&F Finance Officer | <ul style="list-style-type: none">Transfer electricity bills from suppliers into an excel spreadsheet for analysis by Engineering Project Officer 6 and Project Officer SustainabilityOn-charge on-site businesses that pay for electricity consumption based on metered data |
| P&F Environmental Engineer | <ul style="list-style-type: none">Advise P&F Engineering of metering requirements as required |

4.3 Building Management Systems (BMS)

The BMS offers time control on various air-conditioning and lighting systems. The current system offers various features which are utilised to reduce the amount of energy consumed.

Time scheduling of plant and lighting is used to minimise the run time, whilst coordinating this with the times of use. Time scheduling is set at commissioning of building and then as requested by users by P&F Engineering or BMS Contractor.

Air conditioning and lighting on centrally controlled lecture theatres is informed by the Central Bookings software daily and is enabled 30 minutes prior to commencement of use and disabled 15 minutes after its scheduled completion.

After hours running of plant is controlled by push button systems and timers. Plant and/or lighting is enabled by the user pushing the operating button and then the controlled equipment is automatically shut off after a preset period.

The BMS also allows energy efficient control whereby the internal temperature is allowed to change within the comfortable range for the occupants.

Staff wishing to reduce the air-conditioning run times in their area can contact Works Control Centre. They must provide details of the hour's operation. This information will be passed on to relevant P&F staff, who are responsible for matching the air-con run times to the operation hours.

| Responsible person | Action |
|------------------------------------|--|
| BMS Committee | <ul style="list-style-type: none"> • Manage and plan development of the BMS System • Monitors performance of maintenance • Develops energy strategies for BMS and monitors the result of projects |
| Room Bookings, Academic Facilities | <ul style="list-style-type: none"> • Books centrally controlled lecture theatres • Advises when bookings are cancelled or if there is deviation from default bookings. |

4.4 Energy Audits

Energy audits are essential to identify areas where excess energy is being consumed. The audits are generally the first step towards energy management. Results of energy audits are used to determine further actions, if necessary, and which strategy is most suited to addressing the identified issue. Energy audits will be carried out by P&F staff as required, in accordance with Australian Standard 3598:2000 Energy Audits.

| Responsible person | Action |
|--------------------------------|--|
| P&F Deputy Director | <ul style="list-style-type: none"> • Decide on significant audit projects and allocate funding and human resources |
| P&F Senior Electrical Engineer | <ul style="list-style-type: none"> • Organises desktop audits, by analysing metered and BMS data, as required • Works with P&F staff conducting audits to provide appropriate monitoring |
| P&F Environmental Engineer | <ul style="list-style-type: none"> • Provides advice on energy audit priorities and programs |

4.5 Energy Efficient Technology

Energy efficient technology can be used to help reduce energy consumption and demand. The following are measures used to minimise energy consumption:

1. Purchase equipment with high energy star ratings and that have the ability to go into a sleep or hibernation mode;
2. Purchase only what is required. The best way to reduce energy from equipment is to avoid the purchase in the first place (if possible).
3. Design for energy efficiency in new and refurbished buildings
4. Install energy efficient air-conditioning systems
5. Limit HVAC operating times to operational hours.
6. Apply set-point logic enabling the internal temperature to span within the comfortable range for the occupants.
7. Use energy efficient light fixtures and bulbs and lighting management systems which allow lights to switch off when an area is not occupied;
8. De-lamp unnecessary lighting – where existing lighting has a number of tubes per fitting, tube numbers can be reduced, provided effectiveness and lux remain acceptable as per Australian Standard AS 1680.
9. Install variable speed drives on pumps, fans and other appropriate mechanical plant;
10. Use energy efficient and/or solar hot water systems;
11. Research and supply renewable energy where feasible.

| Responsible person | Action |
|------------------------------------|--|
| P&F Deputy Director | <ul style="list-style-type: none"> • Decide on large energy projects and provide funding |
| P&F Senior Electrical Engineer | <ul style="list-style-type: none"> • Advise on lighting equipment efficiency and energy minimisation • Advise on renewable energy projects |
| P&F Operations Project Officer 4 | <ul style="list-style-type: none"> • Advise on HVAC and hot water system efficiency and energy minimisation • Project manage HVAC installation and efficiency upgrades |
| P&F Supervisor Electrical | <ul style="list-style-type: none"> • Carry out lighting upgrade programmes as determined |
| P&F Construction Project Officer's | <ul style="list-style-type: none"> • Incorporate energy efficient design into new building and refurbishment projects |

| | |
|----------------------------|---|
| P&F Environmental Engineer | <ul style="list-style-type: none"> Advise on energy efficient technologies and energy efficient design |
|----------------------------|---|

5. Training & Awareness

5.1 Training

It is the responsibility of the Heads of Schools and Centres, Managers of Farms and Research Stations and other Senior Officers to ensure that their personnel are adequately trained in energy management issues.

Resources to assist are:

- o [Environmental Training Guide for UQ Schools, Centres and Sections \(pdf\)](#)
- o [Environmental Training Checklist for UQ Schools Centres and Sections \(pdf\)](#)
- o [EMS Overview training slides \(pdf\)](#)

5.2 Awareness

P&F's Sustainability Office (previously known as Unigreen) promote energy awareness on campus and implements awareness programs to ensure that the University community is aware of their responsibility to reduce energy consumption and report wastage and understands how they can contribute to energy savings at UQ. Energy saving information is available in the [Switch Off Save Energy Poster](#) and brochure.

P&F's Sustainability Office promotes energy conservation through UQ Sustainability News (previously Unigreen News), UQ News and UQ Update articles, the Green Office Program, forums, events and by making information, advice and resources available on the UQ Sustainability Website. For more information on energy awareness programs see UQ Sustainability Website at: www.uq.edu.au/sustainability

6. Reporting

Energy is managed by Property and Facilities Division through a committee structure. In 2009 the Sustainability Steering Committee replaced the Environmental Management Committee.

The existing sub-committee structure is currently under review and will be established under the Sustainability Steering Committee in 2010.

The Property & Facilities Division publishes an environmental sustainability report annually which includes energy management data, issues, strategies and projects.

Property and Facilities Division also coordinates energy compliance activities including mandatory energy and greenhouse reporting to government.

6.1 Sustainability Steering Committee (SSC)

The SSC is a high level steering committee, chaired by the Executive Direction of Operations that was established in 2009. Initially the focus of the committee will be carbon and energy management. Sub-committees are expected to be set-up in 2010.

6.2 Utilities Management Committee (UMC)

The operational group that discusses methods of Energy Management is the Utilities Management Committee (UMC). This body meets to discuss energy issues, identify strategies, methods by which energy management goals can be achieved and the effect of various projects.

The UMC is chaired by the P&F Engineering Manager and has representatives from P&F and Finance and Business Services and as required, others within or external to the Division may be invited to attend.

The UMC reporting structure is currently being reviewed and will be revised in 2010.

6.2.1 Building Management System (BMS) Committee

The BMS Committee is chaired by the P&F Senior Mechanical Engineer and consists of members from P&F who share responsibility for the BMS. The committee identifies energy saving opportunities using the BMS technology and reports on issues, trends and project results to the UMC.

6.3 Energy Efficiency Group

The Energy Efficiency Group was set up in 2009 as an interim measure while the Sustainability Steering Committee sub-committee structure is established. The group is chaired by the P&F Environmental Engineer and consists of P&F staff involved in energy and environmental management and is focussed on planning, implementing and monitoring the success of no or low capital energy saving projects that typically involve an engineering component as well as a user awareness campaign.

6.4 Renewable Energy Project Control Group (REPCG)

The Renewable Energy PCG, chaired by Professor Max Lu was established in 2009 to identify renewable energy opportunities for UQ and implement large-scale projects. The group's first project is the installation of a 1.2 megawatt solar grid at St Lucia campus. The group reports to the Infrastructure and Space Management Committee.

6.4.1 Renewable Energy Technical Advisory Committee (RETAC)

The RETAC informs and assists the REPCG implement renewable energy projects. The committee is chaired by Professor Paul Meridith, Senior Lecturer, School of Mathematics and Physics and consists of P&F staff involved in energy management and renewable energy experts from Faculties.

6.5 National Greenhouse and Energy Reporting (NGER)

The University of Queensland is required to annually report energy consumption, production and greenhouse gas emissions from all UQ sites, activities and subsidiaries to the Department of Climate Change under new legislation, the National Greenhouse and Energy Reporting Act 2007 (Cth).

P&F Project Officer Sustainability on behalf of the University collates required data and prepares the annual report. The first report was submitted in October 2009. The report covered over 50 sites under UQ 'operational control' and numerous energy sources (electricity, gas, vehicle and plant fuels, incinerator, back-up power generators and solar power generation).

The P&F Deputy Director oversees NGERs compliance and the annual report must be signed off by the Vice Chancellor. See the Carbon Monitoring Procedure for details on mandatory NGERs reporting.

6.6 Energy Efficiency Opportunity Reporting (EEO)

The Energy Efficiency Opportunities Act mandates Australia's biggest companies to undertake comprehensive energy assessments using a whole of business approach and identify energy saving opportunities. Companies are required to report on the outcomes of energy assessment and the business response to opportunities identified. UQ met the 0.5 pet joule threshold in 2008/09 and is required to actively participate from 2010.

P&F on behalf of the University will collate required information (energy consumption, energy assessment process and outcomes and business response to energy saving opportunities identified), conduct energy assessments and report annually (to Government, to the Public and internally). Executives must be involved in the development and implementation of business processes that assess evaluate and implement energy management opportunities. Detailed procedures will be established as UQ's participation in the program progresses.

7. Budget

It is the responsibility of the P&F Director to allocate the necessary resources to the Energy Management Program on a yearly basis.

8. Records

All documents issued with respect to Energy Management are held by the Property and Facilities Division. The term documents, for the purpose of the Energy Management Program, includes the following:

- Energy contracts;
- Operational procedures;
- Checklists;
- Notes;
- Letters;
- Invoices;

- Reports;
- Electronic information; and
- Energy management computer programs.

9. Contacts

Currently no one person has direct responsibility for energy efficiency at The University of Queensland. Instead, responsibilities are shared by several P&F staff.

An Energy Manager will be employed in 2010 to focus on energy efficiency. It is expected that they will become the first point of call for energy management matters.

Table 1. First Point of Contact for Energy Matters

| Issue | Contact | Details |
|--|--|-----------|
| <ul style="list-style-type: none"> • Significant energy projects and strategy • Energy management resourcing and budget | Geoff Dennis, P&F Deputy Director | Ext 51452 |
| <ul style="list-style-type: none"> • Energy policy and procedure • Training and awareness activities • Energy compliance | Stuart Green P&F Environmental Engineer | Ext 51587 |
| <ul style="list-style-type: none"> • Energy metering and monitoring • Energy supply contracts • Energy efficient technology | Adrian Mengede, P&F Senior Electrical Engineer | Ext 53438 |

10. References

- [Energy Management Policy \(pdf\)](#)
- Australian Standard 3598:2000 Energy Audits
- National Greenhouse and Energy Reporting Act 2007 (Commonwealth) and associated legislation
- Energy Efficiency Opportunities Act 2006 (Commonwealth) and associated legislation
- The State of Queensland (Department of Employment, Economic Development and Innovation) 2010, Quick facts, Available: www.energyfutures.qld.gov.au/quick_facts.cfm
- [Environmental Training Guide for UQ Schools, Centres and Sections \(pdf\)](#)
- [Environmental Training Checklist for UQ Schools Centres and Sections \(pdf\)](#)
- [EMS Overview training slides \(pdf\)](#)

Appendix 1: List of UQ Contestable Sites As at 26 February 2010

| Site Name | Billing Address |
|--|---------------------------------|
| St Lucia Campus | Upland Rd, St Lucia |
| Gatton Campus | Warrego Highway, Lawes |
| Ipswich Campus | Salisbury Rd, Ipswich |
| Herston Campus | Herston Rd, Herston |
| Pinjarra Hills Farm | 2436 Moggill Rd, Pinjarra Hills |
| Indooroopilly Experimental Mine | Isles Rd, Indooroopilly |
| Customs House | 399 Queen St, Brisbane |
| Pharmacy Australia Centre of Excellence (PACE) | 20 Cornwall St, Woolloongabba |

Appendix 2: St Lucia Campus Energy Monitoring and Reporting Flow Diagram

